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**the ROYAL COMMISSION on the
NORTHERN ENVIRONMENT**

SMALL SCALE MINING

IN

ONTARIO

**Funding Program
Report**



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ROYAL COMMISSION ON THE NORTHERN ENVIRONMENT

J.E.J. FAHLGREN, COMMISSIONER

SMALL SCALE MINING

IN

ONTARIO

by

Northwestern Ontario
Prospectors' Association

1980

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PART 1

In keeping with the objectives of the Royal Commission on the Northern Environment, one of which is to seek ways of improving the economic position of Northerners, the Northwestern Ontario Prospector's Association is pleased to contribute the following submission.

Prospectors, by the very nature of their work, have always been intimately associated with the environment of the North and have long recognized that a person's economic status is as vital to his sense of well-being as is the quality of the air we breath and the water we drink.

The mining developments which have come about from prospector's efforts have probably provided a greater economic impact in the North than any other activity by individuals.

From the simple beginning of one or two people searching for minerals in a favourable geological formation, to a modern community supported by a producing mine, the history of a mining camp is the story of people generating revenue. The storekeepers who fill the prospectors' grub lists, the pilots who fly the planes, engineers, diamond drillers, construction workers, laborers of many types and the miners themselves, all purchase supplies and services and pay taxes, as do the mining companies which mine the ore. The wealth created by mining and mining

exploration is readily apparent to the people of the North and all are enriched by it, as indeed are all the people of Ontario and Canada.

The mines of Ontario and the dividends paid out by the companies that operate them are known world-wide. In most cases these public companies have mined large ore-bodies capable of maintaining a sustained operation over a period of several years. These developments have led to the building of towns, roads, railroads and power lines and in many cases have provided the sole economic base for an entire community.

The benefits of large mining operations are obvious, but the cold fact is that with every ton of ore mined, the death of a mine is brought nearer, with all the subsequent problems to communities and families that a sudden loss of jobs brings about.

Large ore-bodies are difficult to discover and will become more so in Ontario, which at this stage has been extensively explored by prospectors. It is therefore apparent that if mining is to continue to make a significant contribution to the economy of the North, it is necessary to turn to alternative methods in order to utilise our existing resources. Small scale mining will assist in bridging the gap between the closure of existing mines and the ever diminishing rate of discovery and development of new major deposits.

PART 2

There are in Ontario, particularly in the Precambrian areas underlying much of the North, many small mineral deposits which will never be mined by large corporations because of their limited size. These deposits represent a valuable resource with a total value of millions of dollars and at this time this resource is not being fully utilized. Properly exploited, these small deposits could provide self employment to a number of people and make a significant contribution to the general economy of the North.

Small scale mining is being done successfully in many other countries, particularly Australia, Mexico, U.S.A., and several developing or Third World countries.

A 1977 study by the U.S. Bureau of Mines brought forth the following information: In that country small miners account for the total production of crude asbestos, graphite, kyanite and industrial garnets. They produce more than 60 per cent of the nation's perlite and dimension stone, more than half the barite and feldspar, 49 per cent of the mica and 24 per cent of the gypsum. Most of these mineral products are also found in Ontario.

In some of the Western States, which are prolific producers of gold and silver, the record of production by small scale miners is as follows:

California - 80 percent of the gold and 59 percent of the silver produced.

Nevada - 60 percent of the silver produced.

New Mexico - 35 percent of the gold produced.

Reference:

"The Small Miner - Let Him Look at America"

published by:

Women in Mining
6758 Lewis Street
Arvada, Colorado
U.S.A.

Mexico is a country well suited to small scale mining operations and the government encourages it in several ways. Special regulations, especially in environmental matters are employed to give small mines the latitude they require in some cases. Financial aid is provided for the lease or purchase of equipment with repayment taking the form of a 1 percent royalty on production revenues. Government experts provide technical advice and this is considered to be just as important as economic assistance. Tax exemptions and subsidies are also very generous to small operators to the extent that some operations are virtually tax-free. From 1971 to 1977 the Mexican Government invested approximately \$24 million in assistance to small scale operators and by 1979 most of it had been recovered or soon would be.

India has a wide-spread small scale mining sector. Small mines comprise 96.3 percent of the total number of operating mines and employ 47.3 percent of the total labor force. In 1970 they produced 39.7 percent of the total value of metallic and non-metallic minerals and nearly all of 46 non-metallic minerals.

The importance of small scale mining is recognized on a world-wide basis.

In November 1978 the first biennial conference on small scale mining was held at Jurica, Queretaro, Mexico. It was organized by the United Nations Institute for Training and Research (UNITAR), two Mexican State organizations, the U.S. Geological Survey and others. Seventy countries sent delegates, among them Mr. J. David Mason, Policy Analyst with the Ontario Ministry of Natural Resources.

For the purpose of the conference a small scale operation was defined as: one producing less than 100 tons per day of product; a company which is not listed on a stock exchange and with less than one million dollars capitalization; an operation employing less than 50 people.

Some of the recommendations for government assistance, as decided upon by the delegates are as follows:

Direct technical assistance be provided to small scale mining in the following ways:

- a) making available geoscientific and geotechnical information and providing related assistance.
- b) laboratory and metallurgical analysis and assay services.
- c) equipment pools or other means for making the most suitable equipment available.
- d) custom concentration plants and/or portable mills.

Additional financial support in such forms as:

- a) establishment of special development funds for small scale mining.
- b) tax incentives to encourage development of small deposits.
- c) assistance in marketing.

Provision of necessary infrastructure where justified, such that the small scale mining industry shall receive the benefit of access roads, water and power supplies, medical services and schools.

Provide special training facilities for the small scale miner.

Promote safe and hygienic working conditions.

Education of the small scale miner on the preservation of the environment.

In developing countries small scale operations account for approximately 25 percent of production and employment in the mining industry. It was Mr. Mason's conclusion that if the same ratio could be obtained in Ontario, several thousand new jobs could be created and a half billion dollars could be added to the Gross Provincial Product.

In the State of Western Australia small operations are common in the goldfields. To assist small mines the government has established more than twenty government operated custom mills known as State Batteries. Ore shipments are treated by the batch for which a small charge per ton is levied. (\$2.50 Australian at time of writing.) The bullion is delivered to the miner and the tailings are assayed and half the value also is given to the ore producer. The government retains the other half.

References:

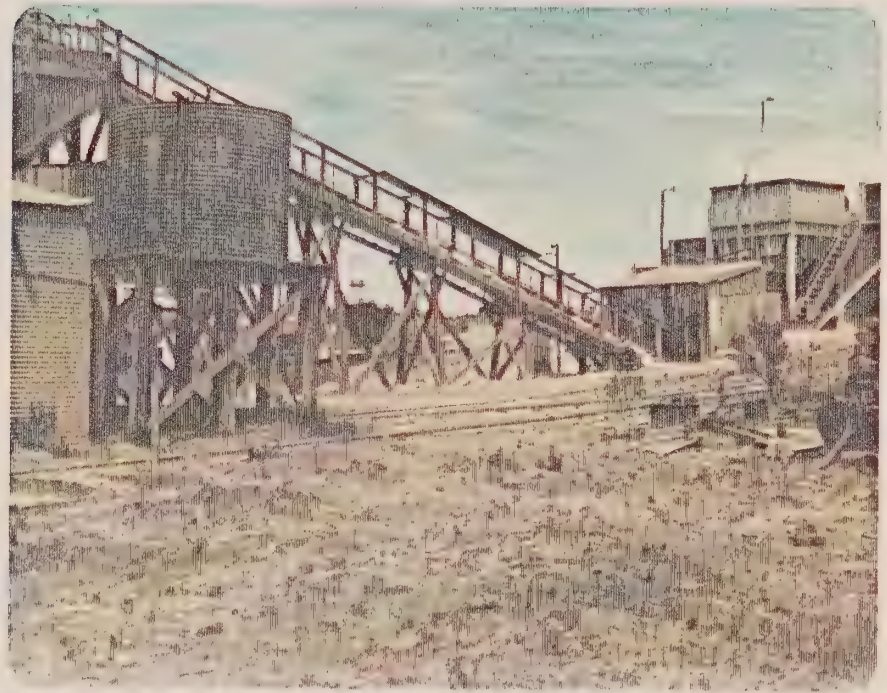
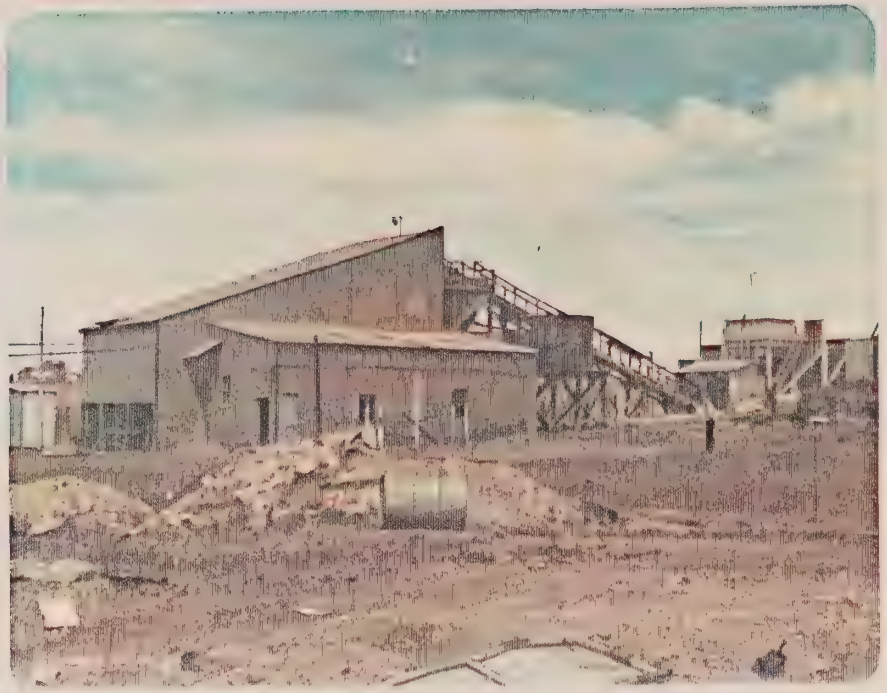
J. David Mason,
Northern Miner, January 25, 1979 and
personal communication.

and

Roy A. Martin, Mina, Nevada, U.S.A.

and

Navojoa, Sonora, Mexico.
personal communication.



Government operated State Battery at Laverton,
Western Australia. The Battery is two banks of
five stamps each with a capacity of one and a
half tons per hour.

pictures by Roy A. Martin

PART 3

The mineral deposits, large and small, which occur in Northwestern Ontario, cover the range of virtually every type of metal and mineral used by modern industry. It follows, therefore, that even the smallest deposits have an intrinsic value.

The precious metals gold, silver and platinum are obvious choices for a small mining venture because of their high value for a relatively small volume of ore. Gold and silver are readily identified in their native state or by assay. They are amenable to concentration into bullion which may be sold to several Canadian refineries or to the Royal Canadian Mint. Platinum group metals are not so easily identified. They are usually found associated with copper and nickel minerals rather than in the native state. Assay procedures for platinum group metals and palladium, which is usually closely associated, are costly and complicated.

In times of high inflation and economic instability, gold, silver and platinum are regarded as a hedge offering security to investors. This leads to high prices on world markets. This situation is evident at this time. (January 1980)

Copper, nickel, cobalt, lead and zinc are usually found in sulfide ores in combinations of two or more metals. In most cases these base metal ores are not rich enough for direct shipping and must be concentrated to make a product acceptable to a smelter. This of course adds to the costs of an operation, for not only must the ore be milled into a concentrate, but there are smelter charges to be paid thereby reducing the net profit.

Molybdenite is another mineral found in many places in Northern Ontario. Most of the deposits are not large but several contain concentrations of good grade material, which at current high prices and projected increasing demand, should be considered for small scale mining. Molybdenite is readily concentrated by flotation and the mineral concentrate MoS_2 may be sold to purchasers. The only plant in Canada for converting MoS_2 to molybdenum metal, Mo, on a custom basis is located at Duparquet, Quebec.

Scheelite, an ore of tungsten is known to occur in the gold mines on Ontario. Tungsten is a strategic metal needed for many uses, particularly in wartime. During World War II some Ontario mines produced scheelite from deposits found with their gold ore. There are at present no producing tungsten mines in Ontario, but scheelite deposits do lend themselves to small scale mining and many small deposits have been mined in the Western U.S.A. The product produced is a mineral concentrate of scheelite, WO_3 , and is sold on the basis of a metric tonne unit (mtu). A metric tonne unit contains 1 per cent WO_3 , or 22.04311 pounds per metric tonne. Scheelite is a heavy mineral (specific gravity 5.9 - 6.1) which is easily concentrated. One consideration which must be taken into account is that scheelite sometimes contains impurities, usually molybdenite, for which penalties may be assessed or which could render the mineral concentrate unacceptable to buyers.

A re-examination of veins dumps and mine workings in areas where scheelite is known to occur could lead to enough ore being found for a small operation. Anyone prospecting for scheelite should have an ultra-violet lamp. The mineral is fluorescent and with practice it is possible to make a fairly close estimate of grade once the mineral has been identified. Note: A metric tonne unit is quoted at U.S. \$134, January 1980.

Pegmatite dykes are another type of mineral deposit of potential value to the small miner. Pegmatites are common in Ontario and are the source of several rare minerals which produce such metals as beryllium, cesium, lithium, tantalum and rare earth elements. Many of these metals have specialized uses in space age technology and demand for them will probably increase. The distribution of the desirable minerals is characteristically erratic, so that selective mining and hand cobbing or sorting is usually required. This type of work is ideally suited to a small scale operation and if markets are available pegmatite dykes should be closely examined for valuable minerals.

There are many industrial minerals in Northern Ontario. Sand and gravel deposits are the most common types that are used to any extent, but many other industrial minerals such as feldspar, calcite, silica, graphite, mica, nepheline syenite, talc, garnet and various types of building stone are available.

The greatest problem encountered with production of industrial minerals in the North is the cost of transporting them to the ready markets where they are in demand. Most of the markets are located in the heavily populated, industrialized urban areas of Southern Ontario, making shipping costs prohibitively expensive. Nevertheless the possibility exists for producing specialized products by small scale mining methods.

Although the more valuable gem stones such as diamonds, rubies and sapphires have not as yet been discovered in any significant amount in Ontario, there are several varieties of semi-precious gemstones and colorful rock types available to the small miner. Amethyst, labradorite, jasper, sodalite and agate have been produced for lapidary work and jewellery making. Any type of colorful rock formation may be utilized by persons of artistic ability. In fact the number of rock types suitable for decorative work is only limited by the imagination of the persons using them.

One good example of local material becoming an economic asset is the mining of amethyst in Thunder Bay District. For many years local people tended to ignore occurrences of amethyst as being of little more value than curios. Finally about 1960 a few enterprising people began to mine and sell amethyst, mostly to the tourist trade until now there is a thriving industry in the district and Thunder Bay amethyst is known world-wide.

The publicity generated by this local endeavour led the government of Ontario to designate amethyst as the official gemstone of the Province.

The famous soap stone carvings of Canadian Eskimos are another example of native people using local material for artistic purposes. What began as a tribal pastime is now an industry supplying genuine objets d'art to avid collectors who have come to realize their true worth.

Fossils are the remains of ancient plants and animals preserved in sedimentary rocks, such as are found in the James Bay lowlands. Good specimens could be of value to schools and museums as well as other collectors.

Mine dumps are another potential source of ore for a small operator. In this case the ore has already been broken and may be deposited on surface. There are in northwestern Ontario many old properties that were never successful producing mines but have shafts and underground workings upon them. Often the shafts were sunk directly on the richest part of a vein and the ore still remains where it was dumped. Though not necessarily "high grade" these dumps represent considerable dollar value. One matter of consideration in relation to mine dumps is the manner in which they are administered. The staking and recording of a mining claim surrounding an ore dump does not confer any title to the dump upon the claim holder. It is necessary to file by tender to the government before the dump may be processed or removed. Why this should be so is difficult to understand since the source material of the dump is the same bedrock covered by a mining claim.

PART 4

Accepting that there are opportunities for small scale mining in Northern Ontario, we meet the question, "Why is not more of it being done?" The answer would simply appear to be that in the past, mining exploration and development has for the most part been directed to large scale operations to the extent that even our existing laws are oriented toward large conventional mines. This situation has served to create problems for anyone contemplating a small scale venture.

Example: Before a mineral deposit may be mined for profit a mining claim must first be staked and recorded, assessment credits equal to 200 days of work must be performed, a survey of the claim must be made by an Ontario Land Surveyor at considerable cost and finally a 21 year lease obtained. For a small scale miner prepared to remove a few hundred tons of ore the cost of the leasing procedure might well be more than the value of the material mined. Even if he does complete the required leasing procedure and show a small profit, he then finds himself in possession of a 21 year lease on a claim which might be mined out in the space of a few weeks or months, and in which he has no further interest.

Recommendation: Staking and recording of a mining claim should be sufficient title to commence a small scale mining operation after all reasonable safety and environmental concerns have been met.

6

A short term renewable lease should be made available without the necessity of a costly land survey unless there is a risk of infringement on private property. Claim boundaries could be checked by a claim inspector who could mark the boundaries accurately enough for all practical purposes.

For administrative purposes it is desirable that an official designation as a small scale operation should be employed. These operations could then be supervised by selected personnel within the Division of Mines and should include a mining engineer and geologist, who would have the authority to grant a lease to a small scale operation with a minimum of delay. Special regulations could then be devised for designated operations.

In most cases the ore found in Ontario deposits is not rich enough to constitute a direct shipping ore; i.e. an ore that may be sold without concentrating. This means that the small scale miner must face the problems of concentrating the ore himself or of shipping it to a custom mill. At present there are few existing mining operations that accept ore for custom milling and those that do may not be situated close enough for a small operator to utilize them. This is not surprising considering the great distances between our mining camps.

Example: The distance from Timmins to Red Lake.

Furthermore, if the custom mill is designed to handle large daily tonnages, it is simply not practical to flush out the circuits and mill a small shipment in a batch. In this case the shipment must be processed along with other material already in the milling circuits and the true value of the ore based on actual value of metal recovered cannot be determined with any degree of certainty. Various methods of sampling the shipment may be employed, but the nature of the ore, particularly gold ore containing native gold may lead to confusing assay results, which lead to disputes between the ore producer and the mill operator. The development of small portable mills will assist in overcoming this problem.

In 1970, the Federal Ministry of Energy, Mines and Resources published a document entitled "A Survey of Known Mineral Deposits in Canada that are not being Mined." This book listed several mineral deposits, many in Ontario and examined reasons why they were not being worked. Two of the conclusions reached which would alter conditions to the benefit of some properties are as follows:

- Successful research into portable mill technology may make feasible the exploitation of a group of relatively small deposits by reducing a major development cost area.

- Great benefit could be derived from the design and development of small plants capable of recovering metallic products from concentrates. This would require new technology, perhaps hydro-metallurgy. The availability of such plants would enable small producers of concentrates to sell directly to metal consumers, thereby making the firms independent of the vagaries of smelter contracts. This would make financing easier for mine development in small ore deposits.

Reference: A Survey of known Mineral Deposits in Canada that are Not Being Mined - By R.C. Annis and D.A. Cranstone, Resources and Development Division, Mineral Development Sector, Energy Mines and Resources, Canada, and M. Vallee, Quebec Mining Exploration Company. (SOQUEM)

Recommendation: Research on small portable mills and metallurgical techniques should be pursued as suggested in the above document. Operating companies should be encouraged to consider establishing custom mills for small ore shipments on existing mine sites, once it has been determined that there is sufficient ore available to supply feed from small scale mining. Where a new operation is feasible government aid, i.e. Dree and Northern Affairs should be made available as is done for other types of business.

Free testing of ores for small scale miners should be provided by government laboratories in order that the most efficient and practical methods of milling and recovery of mineral products will be employed, thus a minimum of waste would be achieved.

The mining methods used to break and move the ore in a small operation will vary according to the nature of the deposit. In many cases there will be no underground workings required, as only ore readily available from surface will be profitable to mine. The use of such common machinery as front end loaders, backhoes and bulldozers may be considered in such cases. In all likelihood the wheel-barrow will still be essential, along with the pick and shovel. Underground workings must of course be viewed in another light because of necessary safety precautions, but here again the ingenuity of miners may lead to the improvisation of new techniques and types of equipment other than the standard types used in large mines.

Recommendation: Ministry of Natural Resources mining engineers and technicians should be available to provide advice on mining methods for particular operations. Mining and safety regulations should be flexible enough to permit the small scale miner to improvise and devise new methods of mining ore, above and below surface in

order to keep costs at a minimum. This may be the determining factor on whether an operation may or not be an economic success.

There is no substitute for experience in mining as in any other type of endeavour. An experienced miner is in fact a highly skilled tradesman and his knowledge of how best to break and move ore is invaluable. Such things as drilling techniques and the type and amount of explosive to use in a given situation are vital to a mining operation and an experienced person is more likely to know how to employ the most practical methods and reduce costs. Whenever possible experienced miners should be involved in a small scale operation.

The costs of bringing supplies and equipment to an operating site, and moving ore or concentrates to market are a major expense which must be met in any type of mining operation. Transportation methods and access are two factors which have a direct influence on the profitability of a small operation and may even be the single determining circumstance in the success or failure of an endeavour. In all likelihood air transportation would be prohibitively expensive for most small mines. Ground or water transportation or a combination of both is really the only practical means to be considered.

Public roads are being built and others are projected to open up the resources of Northern Ontario. Many important mineral producing areas are already well serviced by roads and railroads and logging companies by necessity have built extensive road networks over large areas in the North. In most cases company roads are made available for the use of prospectors, and small miners would probably receive the same consideration. Government financial assistance is available for building access roads to mining operations.

Northern Ontario winters are sometimes regarded as a time of hardship and a detriment to economic activities. To a small scale miner faced with the problem of obtaining cheap, efficient transportation, wintertime may well prove to be a benefit and the key to success in an operation. The numerous lakes and rivers of Northern Ontario provide a natural transportation system, which has been used for centuries. When the waterways freeze they become a ready made highway for suitable vehicles. Large trucks may be driven over them, but it is the snowmobile that affords the greatest potential for winter travel. By packing a trail over the ice, heavy loads may be moved in sleds pulled by snowmobiles. The largest double-tracked models can easily pull loads of two tons or more on a suitable sled or an ice road.

Even when it is necessary to travel across land areas, a winter road of packed snow is easily prepared. Other than cutting thick brush or fallen trees, which soon grow back, no environmental damage of a lasting nature is involved. By stockpiling ore in summer and moving it by snowmobile in winter, a small miner has readily available a method of utilising cheap, efficient transportation. In some cases an operation including the actual mining of the ore might be more feasible in winter than summer. The key to being in harmony with the environment is to turn to an advantage conditions as they exist. Safe winter travel over long distances in the North is one advantage which our environment provides.

The Mines Accident Prevention Association of Ontario has published a bulletin on ice conditions which is reproduced here. It should be studied by anyone using ice for travel.

Methods of financing a small operation are as varied as the operations themselves. In the case of one or two individuals mining a small deposit they may have sufficient capital to finance themselves for a short period of time. A public corporation could obtain funds by the sale of shares to the public. This of course would involve the complicated and costly qualifying procedures required by the Ontario Securities Commission.



Frozen Water - Super Highway or Dead End Street?

Ice can improve the travelway to your prospect or drill site. Ice travel can be a short cut to areas that would be extremely difficult to get to. If you know some of the basic rules of survival and have respect for ice and its recommended carrying capacities, then you are on the road to becoming a safe operator.

Ice Thickness in Inches Clear Blue Lake Ice

Permissable Load

2"	One Man on Foot
3"	Group in Single File or Snow Machine
7-1/2"	Passenger Car (2 ton gross)
8"	Light Truck (2-1/2 ton gross)
10"	Medium Truck (3-1/2 ton gross)
12"	Heavy Truck (7-8 tons)
15"	15 Tons
20"	30 Tons
25"	50 Tons
30"	70 Tons
35"	100 Tons

This chart is taken from the National Safety Council Accident Prevention Manual.

Simple thickness is not always a good measure. It depends on several factors. For example, solid river ice is 15 percent weaker than clear blue lake ice. The temperature also has an effect on ice. As the temperature rises the ice becomes weaker.

Rivers and streams tend to form thinner ice in midstream than on the sides, so measurements on the sides may not be safe. Slush ice formed in early winter is only half as strong as winter ice.

Ice crossing with snow machines should be in pairs with at least 50 feet between machines in single file. Cross ice at moderate, continuous speeds. Sudden acceleration or deceleration causes large differences in weight pressure.

No one has guaranteed your safety with any thickness of ice. So be smart and show you are an experienced ice traveller by lashing long poles to your vehicles. Then, if the ice does break, you give yourself time to escape and your conveyance does not sink.

NOVEMBER 1976

A simple partnership agreement or some type of co-operative arrangement could also be considered.

One type of financing which should be of particular interest to anyone contemplating a small scale mining venture is the Small Business Development Corporation. Legislation was introduced on April 10, 1979 by the Honorable Frank Miller with the intention of encouraging small business ventures in Ontario. Mineral exploration and development is one of the specific businesses covered by the legislation. In order to qualify for the incentives available a Small Business Development Corporation must apply for incorporation to the Ministry of Consumer and Commercial Relations, 55 Yonge Street, Toronto, Ontario. Ministry Staff will advise on incorporation requirements. Some of the requirements are: equity shares must be without par value and equity capital cannot be less than \$250,000 or more than \$5 million. In some cases a corporation may be registered with as little as \$25,000 if it is prepared to increase its equity capital to the minimum operating limit of \$250,000 within one year. This provision should be of value to small mining operations that will extend over a period of more than one year.

As an incentive for people to invest in a Small Business Development Corporation, investors receive from the Ontario government a cash grant or tax credit equal to 30 percent of the amount paid for shares in the corporation.

Detailed information on this program may be obtained by writing:

Ministry of Revenue,
Ontario Small Business Development Corporations,
Queen's Park,
Toronto, Ontario M7A 2B3

or

Telephone toll free in Metro Toronto - 965 - 8470

In area code 807 ask the operator for Zenith 8 - 2000

In other areas dial 1 - 800 - 268 - 7121

Reference: A Guide for Businessmen and Investors, Ontario Small Business Development Corporations, published by the Ontario Government.

In Ontario a mine is not required to pay any taxes on a profit less than \$250,000. This provision will permit many small operations to be virtually tax free as they will not make that much profit.

Federal laws permit a new mine to write off 100 percent of development costs before taxation. (1979 budget)

PART 5

The Ontario Gem Company Limited mines amethyst at a location in McTavish Township, Thunder Bay District. This location has been mined for the past six years, from spring until fall as weather permits.

As many as seven people have been employed at one time, some being involved in the actual mining of the amethyst, while others are engaged in the manufacture of jewellery and other items.

Some of the amethyst is sold as specimens to the tourists who visit the mine site, (estimated 30,000 in 1979.) Other markets have been found in Canada, U.S.A., Germany and Japan.

In order to provide access to the property from Highway 17, it was necessary to construct one mile of new road and put in a railway crossing. In addition more than two miles of existing bush road was upgraded by gravelling and new culverts. This was done without government assistance.

Suggestions for government assistance to this operation include placing new attractive marker signs on the main highway and access roads to help guide potential customers onto the property.

This company is a member of the Amethyst Mining and Dealers Association which was formed to promote the mining and sale of amethyst and to aid in advertising amethyst as the official gemstone of the Province of Ontario. An official amethyst logo comparable to the well known trillium logo is being designed and it will be recommended that it be used in government advertising and literature.

Submission by Ontario Gem Company Limited.

Mr. Russell Cone of Mine Centre, Ontario carried out a small scale gold mining operation on a property in that area over a period of years in the 1940's and 50's. The work force consisted of himself and his two sons and they were able to successfully produce gold bullion.

The method they employed was as follows: The broken ore was first crushed in a jaw crusher then fed into a steam operated two stamp mill. Some gold was trapped in the stamp and the overflow passed over amalgam plates and finally onto corduroy blankets. The balance went to a tailings pile. The trapped gold and amalgam was smelted with a flux in a graphite retort. The resulting bullion was poured into small bars. The material from the corduroy blankets was collected and worked over in a regrind barrel into which a charge of iron balls was placed. Later mercury was added and the resulting amalgam was collected and retorted.



Mining amethyst in McTavish Twp.
Thunder Bay District

The milling equipment was fabricated by the operators themselves, who had a thorough knowledge of mining and milling techniques and could turn their hands to anything mechanical. The operation encountered numerous problems and it was only the improvisations and mechanical expertise of Mr. Cone and his sons that the operation was kept going.

Personal communication from Mr. Harry Bell, Mine Centre, Ontario.

The Crooked Green claim in Pifher Township has an intriguing history. It was a water route claim accessible to the old canoe prospector. Discovered in the late twenties the outcrop was worked intermittently by individual prospectors and some mining companies. The companies did considerable drilling hoping to find a large ore-body to sustain a big mine. Results were inconclusive and options were dropped. The property had by now reached lease status and lay dormant for a few years and finally in 1968 reverted to the Crown.

Tom Christianson, a well known prospector, re-staked the claim and did a considerable amount of work with hand tools and a cobra drill. He took out about 10 tons of hand cobbled material which assayed about 5 ounces to the ton. This was forwarded to Noranda and Christianson received \$2075 for his operation. Noranda examined the property and considered it too small to operate economically. It should be noted that the present day value of this shipment would be a conversion from \$35 to \$700 per ounce. (January 1980)

Today, Christianson, the small mine operator, would have received for his 50 ounce shipment, U.S. \$35,000.

Christianson's mining procedure was a surface operation involving two men and himself. At this period (1969) the Paint Lake road had been built and logging outfits had built a road pattern through the Sturgeon River system, which contained the Crooked Green Creek area. Christianson hauled his 10 tons of ore out with a tractor and a stone boat, loaded it on a truck and forwarded it to Noranda. The biggest expense incurred was transportation to Noranda, a round trip of 400 miles. Also, shipping a small amount of ore direct to the smelter does not give an accurate dollar value to the shipment which is dumped directly into the mainstream hoppers for processing. At the time had Christianson access to a small unit concentrator, he would have developed a successful small mine operation and other prospectors would have duplicated his initiative.

Tom, as he was known to the prospecting fraternity, passed away a few years ago. We had worked the Crooked Green claim together and shipped another 11 tons of high grade ore to Noranda which grossed about \$4,500 based on \$35 per ounce. Its present day value would be more than \$80,000. All these operations were surface trench work involving hand tools, no overhead and labor oriented.

Note: 1st 10 ton shipment that Christianson took out with hand labour netted \$2,075. The largest cost item was truck transport to Noranda. Round trip cost \$600. 2nd 11 ton shipment that Algoma Development sent to Noranda - transportation cost \$900.

Later, my son and I blasted and hand cobbled 120 tons of ore in 15 days. This was taken from an open trench about 80 feet long. A half ton truck was used for power to pull an improvised self-unloader on peeled spruce rails about 50 feet long set in the trench. (see illustration)

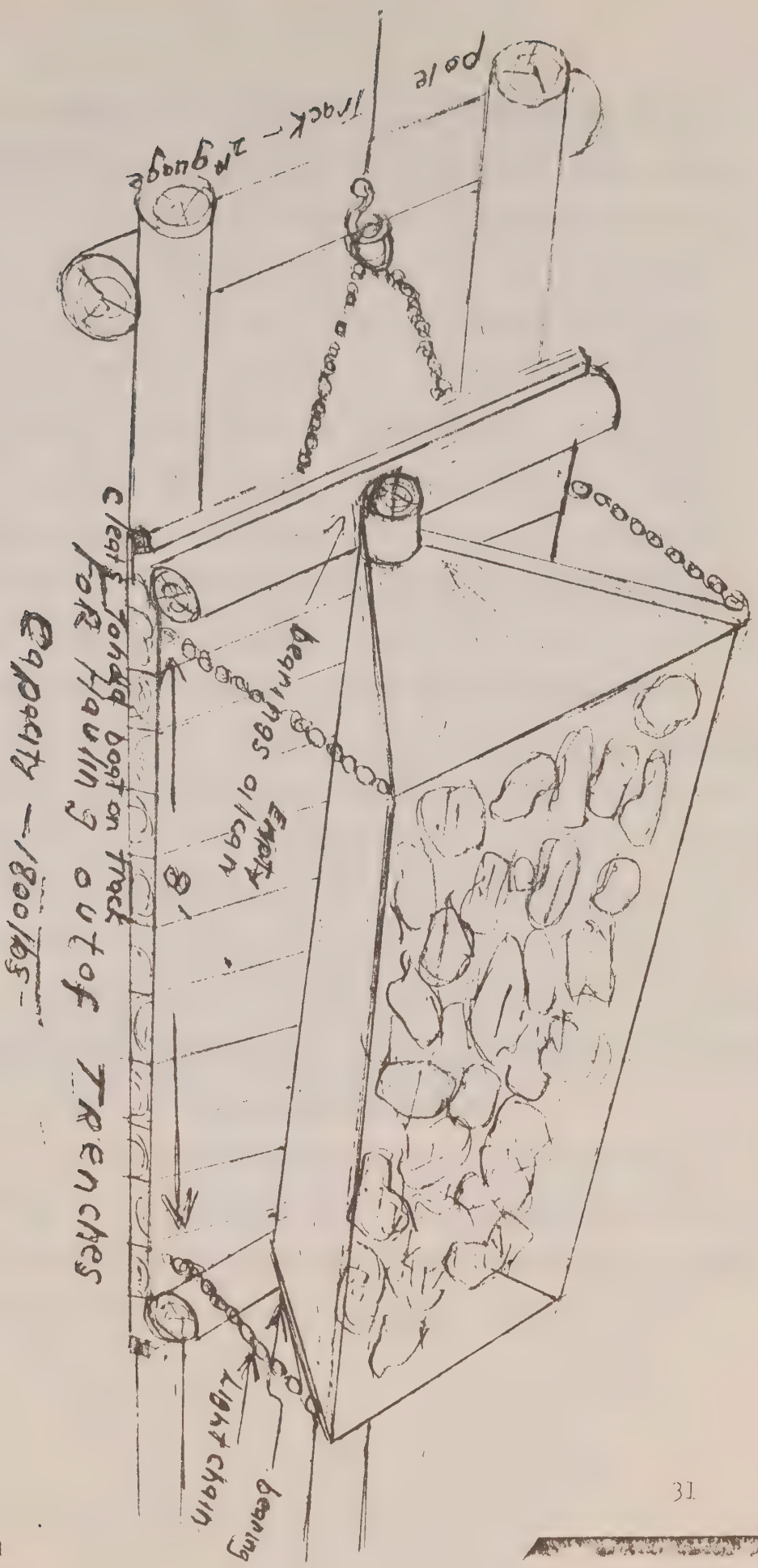
Equipment used in above:

- 1) cobra drill and sharpener
- 2) 3 foot drill steel and bits (4)
- 3) dynamite - $\frac{1}{2}$ case plus 400 feet of fuse, plus caps
- 4) peeled pole railway for taking ore out
- 5) self-unloader improvised for moving ore (capacity 1800 lbs.) all wood and very effective
- 6) power - $\frac{1}{2}$ ton truck and sheaves and cable (airplane cable)

At this time J.C. Calverly, a knowledgeable small mill operator, was doing a clean up job at the Leitch which had been shut down for a few years. His contract was nearly complete when he approached Algoma Development Company, which I represented and suggested moving his equipment to the Crooked Green claim. A mill building was set up and equipment installed which included a ball mill and classifier and crusher and later a flotation unit was added. Cal, as he was known around Beardmore, operated the mill with his son. About 150 ounces were processed and went to the Mint. To-day's value of our product would be U.S. \$105,000. We operated at intervals due to Cal's illness and various isolation problems and closed our operation in 1976.

Our cost analyses and experience showed that a compact mill concentrator, custom built, could make a small mine operation profitable and this based on gold at \$35 per ounce.

Imprvised Self-unloader used on Crooked Green Claim



Sketch by Sol Cowan

Algoma Development Company (a 60 year old mineral exploration company) scrapped the old mill and decided on a research project to justify a new concept for milling small gold deposits.

We contacted highly qualified consultants in Toronto and Montreal and in our first interviews with these people found them in full agreement with our project and concepts. In fact these people had envisioned this type of mill a number of years previous, but had been unable to get venture capital involved. We shipped 400 lbs. of Crooked Green ore to Montreal where a well known metallurgical chemist carried out a pilot operation. Work was completed after a 12 months study and a mill concept was blueprinted. A detailed study of all phases, design, construction, processing and finance was completed.

In June, 1972 we acquired a site adjacent to the Port Arthur Ship Yards. A spur, water, and power were available. Today, a complete modern mill for concentrating gold areas is waiting to start up - possibly sometime in March, 1980.

Northern Concentrators (name of new company) will process Crooked Green ore, ore from the old Empress Mine located 8 miles east of Terrace Bay and possibly help out other prospectors who have small tonnages for milling.

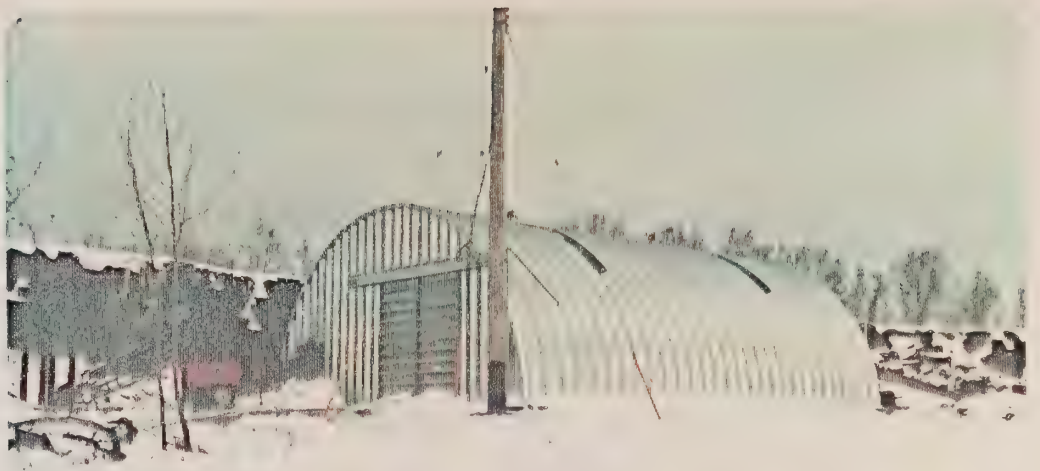
Proto types of the mill may be built if the unit works up to our expectations. We hope to introduce the small mine concept with this facility throughout the country.

Lynx-Canada Explorations Ltd. carried out a small scale mining operation at the Long Lake zinc mine located 40 miles north of Kingston, Ontario during 1973 and 1974. 90,000 tons of ore with an average grade of 18 per cent zinc were produced. The well defined deposit was mined by means of a decline 1,800 feet in length. The work force of eight men including an electrician, mechanic, mill man and five miners, was provided from local labour who had been trained on the spot for the job. They were paid wages and a bonus and proved to be highly efficient and enthusiastic on the operation.

This small operation producing a single base metal product could not support a normal mine-mill operation.

The original planning called for direct shipping of the high grade ore to a plant owned by St. Joe Minerals located at Bolmat Edwards, Gouverneur, New York, a distance of 120 miles. Ontario government restrictions on the shipping of unprocessed ore out of the country, made the plan unfeasible and it was necessary to install a small mill on the property in order to comply with government policy.

The operation proved to be profitable mainly because there was a purchaser for the product located close by. Other governing factors were a good grade of ore, and highly efficient mining methods and work force.



Custom mill of Northern Concentrators at Thunder Bay.

Mill Statistics:

Building	Quonset 60x40x24 fire proof
Power	Hydro
Equipment	water tank (capacity 25 tons)
	crusher (15 tons)
	flotation series 3
	classifier (table)
	All equipment unit motors
	No chemicals used
	Closed circuit flow (daily water loss 5 gal.)
	Approximate cost \$300,000

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The operation was financed without government assistance. Had there been financial assistance available in the early stages, along with specialized regulations for small mines, particularly where shipping the ore over the border was concerned, problems would have been fewer and costs less.

The history of the Long Lake zinc mine does illustrate that small scale mining is profitable and also points out the specialized nature of this type of operation.

Data provided by:

Lynx - Canada Explorations Ltd.

PART 6

Conclusions:

- (a) Mineral production is one industry which actually creates new wealth and in Northern Ontario it is desirable that the population be economically independent if possible.
- (b) The development of small scale mining operations will not, nor are they meant to be, a substitute for the major mining developments which have meant so much to the economy of the North. The experience of other countries suggests that Ontario does possess the potential for small scale mining projects and if fully exploited they could provide a means of broadening the economic base for the population of Northern areas.
- (c) Virtually all government services required to provide assistance to small scale mining are already in place and need only to be organized and utilized.
- (d) Small scale mining is compatible with the principles of conservation in that existing resources would be put to use instead of being wasted by being ignored.
- (e) Environmental considerations associated with small operations are negligible since these operations are of limited extent and duration.

